Improving the search for a Standard Model Higgs boson at the DØ Detector

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The Higgs boson is an important part of the Standard Model, the state-of-the-art particle physics theory. However, its mass is not constrained by theory and needs to be discovered in an experimental search, where Tevatron experiments such as DØ were pioneers. One of the available channels for a Standard Model Higgs search at the Tevatron is the production of a Higgs boson in association with a W boson, where the Higgs decays to two b-quarks and the W decays to a lepton and a neutrino. In this paper we provide an introduction to the Higgs boson and how it fits within the Standard Model, and the DØ detector that was used to collect data for this search. Next we describe the analysis process and the development of a pair of optimization tools that were designed to improve the Higgs search capabilities at DØ. Finally, the results of these improvements are presented with prior results as comparison.